present invention solves the problem of loss of labels, e.g., MPLS labels, when traversing a network topology such as MPLS-nonMPLS-MPLS. In contrast, Casey shows the inverse network topology, i.e., nonMPLS-MPLS-nonMPLS. As recited in Casey at col. 3, lines 33-44:

> "a provider may have **Multi-Protocol Label Switching (MPLS) in the backbone** part of a shared network **but not in all regional networks (See Fig. 3)**. The Provider can operate an MPLS based IP VPN area in the backbone, as described, while using other forms of IP VPN technology (e.g., IP over Frame Relay, IP over leased lines, IP over Local Area Network emulation (LANE), IP over IP, IP over GRE, IP over L2TP, IP over IPSec, IP over Ethernet or any other conventional IP tunneling technology) in the regional VPN areas or it could employ one of these in the backbone." (emphasis added)

The Office should note that neither MPLS over IP nor MPLS over GRE are mentioned. Fig. 3 of Casey also clearly shows MPLS in the backbone. Hence, a packet traversing from one regional area to another regional area through the backbone would traverse a topology of nonMPLS-MPLS-nonMPLS, or some other topology not having an intermediate non-MPLS segment. Turning now to Mauger, that reference does indeed describe MPLS tunnels. However, Mauger does not describe an intermediate portion of the network as being non-MPLS. This is understandable in view of the further distinguishing factor discussed below.

The Office likens the MPLS tunnels of Mauger to the tunnels recited in the claims of the present invention. However, the MPLS tunnel of Mauger is designed to traverse an MPLS network segment and cannot traverse a non-MPLS network segment without modification or enhancement. As stated in Mauger at col. 4, lines 30-37, "a typical MPLS packet comprises the

original IP packet together with a stack of labels **which are used by MPLS nodes** through which the packet passes **to control the onward routing of the packet ... at each node, the current label is used to determine** the onward routing of the packet, i.e., **the tunnel to which the packet is allocated.**" (emphasis added) By definition, a non-MPLS node cannot use an MPLS label to determine onward routing of a packet. As described throughout the present application, the invention addresses the problems associated with label-switched traffic traversing an intermediate non-label-switched segment. Hence, although the tunnels of the presently claimed invention may be tunnels of MPLS traffic, they are not "MPLS tunnels" as that term is used in Mauger.

Features which distinguish the presently claimed invention are already recited in the claims. For example, claim 1 distinguishes the cited combination by reciting **establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain ... encapsulating the packet and label stack ... whereby label stack information is preserved.** Similarly, claim 10 distinguishes the cited combination by reciting **encapsulating logic for encapsulating the packet and label stack information ... and for establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain.** Claims 19, 28, 34, 40, 46, 53 and 57 recite similar distinguishing language. Consequently, Applicant requests that the rejections of claims 1, 10, 19, 28, 34, 40, 46, 53 and 57 be withdrawn.

Claims 2-9, 11-18, 20-27, 29-33, 35-39, 41-45, 47-52 and 54-56 are dependent claims which recite further distinguishing limitations. For example, claim 3 recites that the tunnel is an IP tunnel, claim 4 recites that the tunnel is a GRE tunnel, and claim 5 recites a label switching protocol identifier. Further, these claims are allowable for the reasons stated above with respect

to the independent claims. Consequently, Applicant requests that the rejections of claims 2-9, 11-18, 20-27, 29-33, 35-39, 41-45, 47-52 and 54-56 be withdrawn.

The Office objected to claims 28-31, 33-37, 39-43, 46-49, and 53-57 because of use of the term "decapsulating." The claims have been amended in accordance with the comments of the Office Action. In particular, the term has been replaced with "de-encapsulating" in the claims. Consequently, Applicant requests that the objections to claims 28-31, 33-37, 39-43, 46-49, and 53-57 be withdrawn.

The Office rejected claims 19-27 and 50-52 under 35 USC §101. Amendments have been made such that computer programs are claimed rather than packets or protocols. Consequently, Applicant requests that the rejections of claims 19-27 and 50-52 under 35 USC §101 be withdrawn.

The Office rejected claims 19-27, 40-52 under 35 USC §112 based on various uses of language in the claims which are believed to be overcome by the claims as amended. Consequently, Applicant requests that the rejections of claims 19-27, 40-52 under 35 USC §112 be withdrawn.

Applicants have made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Holmes W. Anderson, Applicants' Attorney at 978-264-6664 (ext. 305) so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,

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Date

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CLAIMS

1. (currently amended) A method for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, the method comprising:

establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain;

encapsulating the packet and label stack to form ~~a tunnel~~ an encapsulated packet; and

forwarding the ~~tunnel~~ encapsulated packet through the tunnel,

whereby label stack information is preserved.

2. (original) A method according to claim 1, wherein establishing a tunnel includes mapping a top label of the label stack to the tunnel.

3. (original) A method according to claim 1, wherein the tunnel is an IP tunnel.

4. (original) A method according to claim 3, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

5. (original) A method according to claim 4, wherein encapsulating the packet and label stack information includes providing a label switching protocol identifier such that the second label switched domain may identify the packet and label stack.

6. (original) A method according to claim 1, wherein the first label switched domain is a Multiprotocol Label Switching (MPLS) domain.

7. (original) A method according to claim 1, wherein the second label switched domain is a Multiprotocol Label Switching (MPLS) domain.

8. (original) A method according to claim 1, wherein the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

9. (currently amended) A method according to claim 8, wherein encapsulating the packet and label stack information includes providing an MPLS identifier in the ~~tunnel~~ encapsulated packet such that the second label switched domain may identify the packet and label stack.

10. (currently amended) A device for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, the device comprising:

label switching forwarding logic for identifying the next hop for the packet;

encapsulating logic for encapsulating the packet and label stack information to form ~~a tunnel~~ an encapsulated packet and for establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain; and

forwarding logic for forwarding the ~~tunnel~~ encapsulated packet through the tunnel.

11. (original) A device according to claim 10, wherein the label switching forwarding logic includes mapping logic for mapping a top label of the label stack to the tunnel.

12. (original) A device according to claim 10, wherein the tunnel is an IP tunnel.

13. (original) A device according to claim 12, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

14. (currently amended) A device according to claim 13, wherein the ~~tunnel~~ encapsulated packet includes a label switching protocol identifier such that the second label switched domain can identify the packet and label stack.

15. (original) A device according to claim 10, wherein the first label switched domain is a Multiprotocol Label Switching (MPLS) domain.

16. (original) A device according to claim 10, wherein the second label switched domain is a Multiprotocol Label Switching (MPLS) domain.

17. (original) A device according to claim 10, wherein the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

18. (currently amended) A device according to claim 17, wherein the ~~tunnel~~ encapsulated packet includes an MPLS identifier such that the second label switched domain may identify the packet and label stack.

19. (currently amended) A computer program product for generating a packet for use on a computer system for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, the computer program product comprising a computer usable medium having computer readable program code thereon, the computer readable program code including:

program code for establishing an IP tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain;

program code for encapsulating the packet and label stack information to form ~~a tunnel~~ an encapsulated packet; and

program code for forwarding the ~~tunnel~~ encapsulated packet through the tunnel.

20. (original) A computer program product according to claim 19, further including program code for mapping a top label of the label stack to the tunnel.

21. (original) A computer program according to claim 19, wherein the tunnel is an IP tunnel.

22. (original) A computer program product according to claim 21, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

23. (currently amended) A computer program product according to claim 22, further including program code for providing a label switching protocol identifier in the ~~tunnel~~ encapsulated packet such that the second label switched domain may identify the packet and label stack.

24. (original) A computer program product according to claim 19, wherein the first label switched domain is a Multiprotocol Label Switching (MPLS) domain.

25. (original) A computer program product according to claim 19, wherein the second label switched domain is a Multiprotocol Label Switching (MPLS) domain.

26. (original) A computer program product according to claim 19, wherein the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

27. (currently amended) A computer program product according to claim 26, further including program code for providing an MPLS identifier in the ~~tunnel~~ encapsulated packet such that the second label switched domain may identify the packet and label stack.

28. (currently amended) A method for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, the method comprising:

establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain;

receiving a ~~tunnel~~ an encapsulated packet from the tunnel, the ~~tunnel~~ encapsulated packet ~~comprised of an encapsulated packet and~~ including a label stack;

~~decapsulating~~ de-encapsulating the encapsulated packet and label stack; and

forwarding the ~~decapsulated~~ de-encapsulated packet and label stack across the second label switched domain.

29. (original) A method according to claim 28, wherein the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

30. (original) A method according to claim 28, wherein the tunnel is an IP tunnel.

31. (original) A method according to claim 30, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

32. (currently amended) A method according to claim 28, wherein the ~~tunnel~~ encapsulated packet includes a label switching protocol identifier such that the second label switched domain may identify the packet and label stack.

33. (currently amended) A method according to claim 29, wherein the ~~tunnel~~ encapsulated packet includes a MPLS identifier such that the second label switched domain may identify the packet and label stack.

34. (currently amended) A device for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, the device comprising:

receiving logic for receiving ~~a tunnel~~ an encapsulated packet from a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain, the ~~tunnel~~ encapsulated packet ~~comprised of an encapsulated packet and~~ including a label stack;

~~decapsulating~~ de-encapsulating logic for ~~decapsulating~~ de-encapsulating the encapsulated packet and label stack; and

forwarding logic for forwarding the ~~decapsulated~~ de-encapsulated packet and label stack across the second label switched domain.

35. (original) A device according to claim 34, wherein the tunnel is an IP tunnel.

36. (original) A device according the claim 35, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

37. (original) A device according to claim 34, wherein the first label switched domain is an MPLS domain and the second label switched domain is a MPLS domain.

38. (currently amended) A device according to claim 34, wherein the ~~tunnel~~ encapsulated packet includes a label switching protocol identifier such that the second label switched domain may identify the packet and label stack.

39. (currently amended) A device according to claim 37, wherein the ~~tunnel~~ encapsulated packet includes a MPLS identifier such that the second label switched domain may identify the packet and label stack.

40. (currently amended) A computer program product for use on a computer system for establishing a label switched path for forwarding a packet with a label stack in a communication network, the communication network including a first label switched domain and a second label switched domain interconnected by a non-label switched domain, ~~the device comprising:~~ the computer program product comprising a computer useable medium having computer readable program code thereon, the computer readable program code including:

program code for establishing a tunnel across the non-label switched domain which connects the first label switched domain and the second label switched domain;

program code for receiving ~~a tunnel~~ an encapsulated packet from the tunnel, the ~~tunnel~~ encapsulated packet ~~comprised of an encapsulated packet and~~ including a label stack;

program code for ~~decapsulating~~ de-encapsulating the encapsulated packet and the label stack; and

program code for forwarding the ~~decapsulated~~ de-encapsulated packet and label stack across the second label switched domain.

41. (original) A computer program product according to claim 40, wherein the tunnel is an IP tunnel.

42. (original) A computer program product according to claim 41, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

43. (original) A computer program product according to claim 40, wherein the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

44. (currently amended) A computer program product according to claim 40, wherein ~~tunnel~~ encapsulated packet includes a label switching protocol identifier such that the second label switched domain may identify the packet and label stack.

45. (currently amended) A computer program product according to claim 43, wherein the ~~tunnel~~ encapsulated packet includes a MPLS identifier such that the second label switched domain may identify the packet and label stack.

46. (currently amended) A method, executed in ~~In~~ a communication system having a first label switched domain interconnected with a second label switched domain by a non-label switched domain, ~~a method~~ for forwarding a label switched packet from the first label switched domain to the second label switched domain, the method comprising:

establishing a tunnel from an egress device of the first label switched domain to an ingress device of the second label switched domain over the non-label switched domain;

encapsulating the label switched packet by the egress device of the first label switched domain;

forwarding the encapsulated label switched packet by the egress device of the first label switched domain over the tunnel to the ingress device of the second label switched domain;

~~decapsulating~~ de-encapsulating the encapsulated label switched packet by the ingress device of the second label switched domain; and

forwarding the ~~decapsulated~~ de-encapsulated label switched packet by the ingress device of the second label switched domain based upon label switching information in the packet.

47. (original) A communication system according to claim 46, wherein the first label switched domain i[redacted] and the second label switched domain is a MPLS domain.

48. (ori[redacted] according to claim 46, wherein the tunnel is an IP tunnel.

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49. (o[redacted]m according to claim 48, wherein the IP tunnel is a Generic Routing [redacted].

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50. (currently amended) A computer program for executing a tunneling protocol for interconnecting a first label switched domain and a second label switched domain, ~~the tunneling protocol~~ comprising:

encapsulation means for encapsulating a payload packet from a label switched protocol; and

a protocol type indicator for identifying the label switched protocol.

51. (currently amended) A computer program ~~tunneling protocol~~ according to claim 50, wherein the label switched protocol is MPLS.

52. (currently amended) A computer program ~~tunneling protocol~~ according to claim 50, wherein the tunneling protocol is a modified Gencric routing Encapsulation (GRE) protocol.

53. (currently amended) A communication system comprising a first label switched domain having an egress device, a second label switched domain having an ingress device and a non-

label switched domain which couples the egress device of the first label switched domain to the ingress device of the second label switched domain, wherein a label switched path for forwarding a packet and a label stack is established by

establishing a tunnel from an egress device of the first label switched domain to an ingress device of the second label switched domain over the non-label switched domain;

encapsulating the packet and label stack by the egress device of the first label switched domain;

forwarding the encapsulated packet and label stack by the egress device of the first label switched domain over the tunnel to the ingress device of the second label switched domain;

~~decapsulating~~ de-encapsulating the encapsulated packet and label stack by the ingress device of the second label switched domain; and

forwarding the ~~decapsulated~~ de-encapsulated packet and label stack by the ingress device of the second label switched domain based upon label switching information in the packet.

54. (original) A communication system according to claim 53, the first label switched domain is a MPLS domain and the second label switched domain is a MPLS domain.

55. (original) A communication system according to claim 53, wherein the tunnel is an IP tunnel.

56. (original) A communication system according to claim 55, wherein the IP tunnel is a Generic Routing Encapsulation (GRE) tunnel.

57. (currently amended) A communication system comprising:

a first label switched domain for forwarding a label switched packet, the first label switched domain having a plurality of label switching devices including an egress device;

a second label switched domain for forwarding the label switched packet, the second label switched domain having a plurality of label switching devices including an ingress device; and

a non-label switched domain having a plurality of forwarding devices, the non-label switched domain coupled the egress device of the first label switched domain to the ingress device of the second label switched domain; wherein:

the egress device establishes a tunnel from the first label switched domain to the ingress device of the second label switched domain across the non-label switched domain;

the egress device encapsulates the label switched packet;

the egress device forwards the encapsulated label switched packet over the tunnel to the ingress device of the second label switched domain;

the ingress device receives the encapsulated label switched packet from the tunnel;

the ingress device ~~decapsulates~~ de-encapsulates the encapsulated label switched packet; and

the ingress device forwards the ~~decapsulated~~ de-encapsulated label switched packet based on label switching information in the packet.